REGULARITY OF EMPLOYMENT—NEED OF STAND-ARDIZATION OF METHODS FOR MEASURING REGULARITY OF EMPLOYMENT.*

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The ascertainment of annual earnings of industrial workers has been a fascinating will o' the wisp to the government statistician.   The lack of information necessary for this purpose, for which the average factory pay roll is notorious, is sufficient to drive the statistician to despair.   Employees are designated by arbitrary numbers which are given without distinction as to sex, occupation, method of compensation, etc. Number 25 in a garment factory may stand one week for a cutter, a highly skilled male worker, receiving $25 per week, and the following week, upon the discharge of the cutter, the same number may be given to a "finisher," a girl worker who has earned $7.88 by steady plugging at prevailing piece rates. There is nothing to indicate that number 25 of the former week and number 25 of the latter are two distinct individuals. Add to this the shifting of employees from shop to shop and it will be clear why it is practically impossible to trace the annual earnings of individual workers in most industries.

In 1913 the writer was engaged in an investigation of wages in the Dress and Waist Industry of New York City under the joint auspices of the Manufacturers' Association and the Union, with a view to standardization of piece rates paid in that industry.   The pay rolls proved no exception to the general rule.   The extreme fluctuations of employment, however, due to seasonal influences in that industry made some kind of an estimate of the annual earnings of the workers imperative. For this purpose the index number method was resorted to for the first time, as far as the writer is aware, in the measurement of wage fluctuations.   The succeeding steps used in the process were as follows:

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TABLE I.

FLUCTUATIONS OF EMPLOYMENT AND WAGES IN THE DRESS AND WAIST INDUSTRY FOR 1912.

Week.	Number of Employees.	Amount of Wages Paid Out.	Per Cent. (Busiest Week=100). (a)	
			Em- ployees.	Wages.
1	14,550	$130,484	71	53
2	15,443	153,598	75	63
3	16,190	165,549	79	67
4	16,960	180,673	83	74
5	17,849	192,382	87	78
6	18,329	202,506	89	82
7	19,146	212,972	93	87
8	19,633	221,929	96	90
9	20,183	210,614	98	98
10	20,409	244,981	99	100
11	20,521	245,494	100	100
12	20,524	245,177	100	100
13	20,374	236,951	99	97
14	19,313	194,583	94	79
15	19,298	201,271	94	82
16	19,145	208,053	93	85
17	18,974	203,595	92	83
18	18,478	192,435	90	78
19	18,078	185,635	88	76
20	17,501	178,117	85	73
21	16,761	166,905	82	68
22	16,509	156,863	80	64
23	16,350	167,384	80	68
24	16,514	169,487	80	69
25	15,961	159,534	78	65
26	14,514	141,406	71	58
27	12,292	105,559	60	43
28	10,816	95,279	53	39
29	10,304	94,149	50	38
30	11,147	105,290	54	43
31	12,429	115,379	61	47
32	13,945	138,336	68	56
33	15,677	159,322	76	65
34	16,888	177,802	82	72
35	17,686	195,967	86	80
36	18,363	191,971	89	78
37	18,107	170,519	88	69
38	18,660	197,465	91	80
39	19,030	215,996	93	88
40	19,199	215,151	94	88
41	19,388	220,809	94	90
42	19,686	216,626	96	88
43	18,695	202,148	91	82
44	17,791	188,115	87	77
45	16,769	165,736	82	68
46	16,428	167,753	80	68
47	16,378	162,302	80	66
48	15,867	149,128	77	61
49	16,364	162,455	80	66
50	16,604	169,000	81	69
51	16,879	170,462	82	69
52	16,290	150,827	79	61
Average	17,100	178,887	83.3	73

(a) In the column for employees the busiest week means the week in which the maximum number were employed; in the column for wages it means the week in which the maximum amount was paid.

First, the earnings of individual employees during the busiest week of the year were ascertained for each factory under investigation. Next, the total number of workers employed and the total amount of wages paid out each week of the year by each of those factories were ascertained. The data were arranged in tabular form, each factory forming a vertical column of 52 lines, each line representing the total wages paid by that factory during that week. The wages paid each week by the 260 shops for which these data were obtained, were then added horizontally across the table, the total weekly wages for the industry as a whole thus forming an additional vertical column.

The next step was to express the weekly wage totals for the industry in terms of index numbers. The week showing the highest wage total (the eleventh week, see Table I) was regarded as the busiest week for the industry as a whole and the wage total for that week expressed as 100. The wages for each of the remaining 51 weeks were expressed as percentages of the wages of the busiest week, the lowest week (the twenty ninth) showing only 38 per cent. and the average for the year being 73 per cent. of the wages in the busiest week of the year.

The report of the investigation was published as Bulletin 146 of the United States Bureau of Labor Statistics, and Table I is reproduced from page 160 of that Bulletin.

The annual average index number of wages, equal to 73, was used as a basis in arriving at an estimate of the average annual earnings of workers in different occupations. Thus, if the earnings of a woman operator during the busiest week were equal to, say, $10.00, her average weekly earnings during the year would be 73 per cent. of that, or $7.30, and her annual earnings 52 times $7.30, or $376.60.

In a supplementary investigation last winter, Miss Juliet Stuart Poyntz had occasion to use the raw material of the investigation covered by Bulletin 146. In order to ascertain the extent of variation of employment in different types of shops, she applied to separate shops the method used by the writer for the industry as a whole. The percentages for the individual shops calculated under her direction are shown in the following table:

TABLE II.

FLUCTUATIONS OF EMPLOYMENT IN VARIOUS SHOPS AND GROUPS OF SHOPS IN THE DRESS AND WAIST INDUSTRY.

Per Cent. of Employment.	High Grade Shops.		Low Grade Shops.		Whole Industry.	
	Number of Shops.	Per Cent. of all High Grade Shops.	Number of Shops.	Per Cent. of all Low Grade Shops.	Number of Shops.	Per Cent. of all Shops.
Less than 20............	..	..	..	..	..	..
20–24..................	..	..	..	..	..	..
25–29..................	1	1.0	2	1.2	3	1.0
30–34..................	2	2.1	4	2.4	6	2.3
35–39..................	4	4.2	1	0.6	5	2.1
40–44..................	5	5.2	19	11.2	24	9.0
45–49..................	8	8.3	27	16.5	35	13.5
50–54..................	12	12.4	37	21.9	49	18.4
55–59..................	20	20.3	18	10.8	38	14.2
60–64..................	21	21.7	25	14.8	46	17.3
65–69..................	13	13.4	17	10.0	30	11.3
70–74..................	7	7.2	14	8.3	21	7.9
75–79..................	4	4.2	4	2.3	8	3.0
Total..............	97	100.0	168	100.0	265	100.0

Average (simple).. 55.6
Average (weighted).. 58.2

As will be seen from the preceding table, out of 266 shops there were only three shops with an average of 73 per cent., the figure for the industry as a whole obtained by the writer, and only four shops had higher averages, ranging from 75 to 78 per cent. The percentages for the remaining shops ranged from 27 to 72. Averaging the percentages of the separate shops and groups of shops for the industry as a whole, Miss Poyntz obtained the figure of 55.6 per cent. as a simple average and 58.2 per cent. as a weighted average.

The discrepancy between the results obtained by the two methods was so striking as to suggest at first that an error had crept into the calculations of one or the other investigation. An analysis of the tabular material, however, disclosed the interesting fact that the figures of 73 per cent. and 58.2 per cent. respectively for the industry as a whole obtained by the two methods were each mathematically correct, the discrepancy being due to the difference in method of application of the index number principle.

An examination of the diagram showing fluctuations of employment in the industry (p. 169 of Bulletin 146) will disclose the fact that the fluctuations, while roughly synchronous in different groups of shops, are not entirely coincident; the same is true as to individual shops, that is to say, while all the shops are more busy in the spring than they are in the summer, the highest peak in the employment curve may be reached during the tenth week in one shop, the ninth week in another, the eighth in a third, the eleventh in a fourth, and so on. Again, the extent of fluctuation differs for various groups of shops, and still more so for individual shops. The combining of the wages of all the shops into one total for each week had the effect of smoothing out the sharp peaks in the curves for the individual shops, the coinciding of the peak of one shop and the depression of another having a mutually neutralizing effect. In other words, the combination of what might have been 260 separate curves into one tended to flatten out the curve representing the industry as a whole. The flatter the curve, the less the fluctuations, and the nearer, of course, it approaches a straight line representing 100 per cent.

To put it in less technical terms: If the industry were so organized that workers unemployed in their own shops could be transferred to other, more busy shops, so that the entire industry formed in this respect an integral unit, the method of combining the wages of all the shops into one total for the industry as a whole would have been entirely proper; but, as a matter of fact, there is no such mobility of labor in the industry during the season. At the end of the season, a considerable number of workers do leave their places in search of better positions in other shops; but, while the season lasts, very few workers leave their shops. This means that the regularity of employment for the bulk of the workers in the industry is measured not by the quantity of work available in the industry as a whole, but by that to be had in their respective shops; and it, therefore, seems that the summary of conditions in the industry as a whole can be correctly formed by arranging the annual percentages of the separate shops, as was done by Miss Poyntz and not by the method used by the writer.

This runs counter to accepted statistical standards according to which the averaging of percentages is wrong and only absolute numbers should be dealt with.

The fact that the method adopted by the writer has since been followed in investigations of other industries conducted by the Federal Bureau of Labor Statistics as shown in its reports in Bulletins 183 and 190 lends added interest to the question of what is the correct method of measuring regularity of employment.

It is hoped that this account may lead to further discussion of the subject and contribute to the standardization of methods in the measurement of one of the most important of economic phenomena,—the fluctuation of employment and its effect upon annual earnings, in regard to which there is an extreme paucity of accurate data.